

TABLE OF CONTENTS

Safety Standards for Truck Brakes

Scope	14-80h- 1
Definitions	14-80h- 2
Out-of-service condition	14-80h- 3
Severe defect or combination of defects	14-80h- 4
Out-of-service braking system defects.	14-80h- 5
Out-of-service braking system defects in combination	14-80h- 6
Severe braking system defects.	14-80h- 7
Severe braking system defects in combination	14-80h- 8

Safety Standards for Truck Brakes

Sec. 14-80h-1. Scope

These regulations specify the identification of mechanical defects in the braking system of vehicles with a gross vehicle weight of ten thousand pounds (10,000 lbs.) or more that may result in the vehicle being declared “out of service” and the establishment of a classification of defects or combination of defects which are deemed to be severe, as required by Public Act No. 88-313.

(Effective February 24, 1989)

Sec. 14-80h-2. Definitions

As used in following regulations Sections 14-80h-3 through 14-80h-8, the following words and phrases shall have the following meanings:

(a) **Air brakes.** Brakes that utilize compressed air as the sole source of energy for application of brakes at the vehicle’s wheels.

(b) **Air chamber.** A device or chamber which receives pressurized air and in turn exerts a force through the actuator to apply the foundation brakes.

(c) **Air compressor.** Device to build up and maintain required air pressure.

(d) **Air check valve.** An automatic control device designed to provide air flow in one direction only.

(e) **Air hose.** A flexible form of air line.

(f) **Air lines.** Conductor used to carry compressed air from one part of an air brake system to another and from tractor to the trailer. One line is called the emergency or supply line and is always charged with compressed air. The other is called the service or control line. When the air brake treadle valve is depressed, air flows from the supply reservoir through the service line and causes the brakes to apply.

(g) **Air over hydraulic brake system.** A brake system in which the operator’s braking effort is reduced utilizing compressed air acting on the hydraulic system which actuates the wheel brakes.

(h) **Air reservoir.** Storage tank for compressed air.

(i) **Brake, cam.** A type of wheel brake in which the brake shoe and lining assemblies are spread apart against the drum by the rotation of a “S” shaped or other type cam.

(j) **Brake, disc.** Brakes that function by causing friction pads to press on either side of a disc rotating along with the wheel.

(k) **Brake drum.** Means the individual cupped metal drums to which motor vehicle wheels are each attached and against whose interior surface brake shoe pressure is applied to effect stopping, holding or control of forward or backward vehicle movement.

(l) **Brake, foundation.** The nonrotational components of a brake, including the actuating mechanism for development of retarding forces.

(m) **Brake lining/pad.** A material designed to create friction that is attached to the brake shoe and that contacts the rotating unit to supply braking force.

(n) **Brake shoe.** The nonrotating unit of the brake to which the brake lining/pad is attached.

(o) **Brake, spider.** That portion of the foundation brake which is anchored to either end of the axle bar, variously bolted or welded. Also known as support plate or backing plate.

(p) **Brake system components.** Any part required for the operation of vehicle brakes including those required under the provisions of the Code of Federal Regula-

tions Title 49 Sections 393.40 thru 393.52, inclusive, and 396.3, 571.105, 571.121 and DMV regulations, Sections 14-80-2a (b) and 14-80-3a.

(q) **Brake, wedge.** A type of wheel brake in which the brake shoe and lining assemblies are spread apart by forcing a wedge between opposing ends of the assemblies, pushing them outward against the brake drum.

(r) **Dolly (or converter gear).** The coupling device composed of one or two axles and a fifth wheel by which a semi-trailer can be coupled to the rear of a tractor-trailer combination, forming a double bottom rig, or as otherwise defined in CGS Section 14-260n (7).

(s) **Electric brake system.** A brake system that utilizes electro-magnetic forces as the sole source of energy for application of brakes at the vehicle's wheels.

(t) **Federal motor carrier safety regulations (FMCSR).** CFR Title 49, Parts 350 thru 399 inclusive.

(u) **Flexural crack.** Is any crack that shows movement upon loading, such as brake application.

(v) **Governor (air).** Device to automatically control the air pressure being maintained by the compressor in the air reservoirs, normally keeping air pressure between 90 and 120 psi, and which prevents excessive air pressure from building up.

(w) **Gross vehicle weight.** For the purpose of application of this regulation "gross vehicle weight" shall mean the GROSS VEHICLE WEIGHT RATING (GVWR) as defined and specified by the vehicle manufacturer for a single vehicle.

(x) **Hydraulic brake system.** Brakes that depend on transmission of hydraulic pressure from a master cylinder to the wheel cylinders.

(y) **Hydraulic boosted brake system.** A brake system in which the operator's braking effort is reduced through the use of a hydraulic pump which separately acts on another hydraulic system which actuates the wheel brake. The hydraulic pump may be engine driven or driven by an electric motor.

(z) **Imminent hazard.** Means any condition of vehicle, employee, or commercial vehicle operations which is likely to result in serious injury or death if not discontinued immediately.

(aa) **Low-air-warning device.** Means of warning a truck driver that his vehicle is not maintaining the proper amount of air pressure needed to operate the brakes, etc. Can be a buzzer, a flashing red light on the instrument panel, or a small red metal flag that drops into the driver's line of vision.

(bb) **Mechanical defect.** Any faulty condition which in itself or upon its failure would prevent any mechanical component(s) in the brake system from operating within the manufacturer's specified tolerance.

(cc) **Push-rod stroke.** The distance traveled by the brake chamber push rod in moving from the fully released position to the fully applied position with minimum air pressure of 85 psi at the vehicle's air pressure gauge.

(dd) **Slack adjuster.** An adjustable mechanical lever fixed to the brake camshaft on one end, to the brake chamber push rod on the other, and determined to transmit brake chamber energy to the cam shaft.

(ee) **Slack adjuster stroke.** The distance traveled by the portion of the slack adjuster at its attachment to the push rod in moving from the fully released position to the fully applied position with minimum air pressure of 85 psi at the vehicle's air pressure gauge.

(ff) **Vacuum brake system.** A brake system in which the operator's braking effort is reduced through a vacuum booster acting on the hydraulic system which actuates the wheel brake.

(Effective February 24, 1989)

Sec. 14-80h-3. Out-of-service condition

Any motor vehicle(s) found to have a defect or combination of defects or severe defects or combination of defects deemed severe in its braking system in accordance with Section 14-80h-5 through Section 14-80h-8 inclusive of this regulation or otherwise determined to be so hazardous as to likely cause an accident or breakdown, or when such condition(s) would likely contribute to loss of control of the vehicle(s) by the driver, said vehicle(s) shall be declared out-of-service. No person shall operate any motor vehicle after being declared or marked out-of-service in accordance with CFR Title 49, Part 396.

(Effective February 24, 1989)

Sec. 14-80h-4. Severe defect or combination of defects

Any defect(s) in a motor vehicle(s) braking system which in itself is an imminent hazard or in combination are an imminent hazard to highway safety, which is likely to result in serious injury or death, shall be deemed to be severe in accordance with Section 14-80h-7 and Section 14-80h-8 of this regulation. Any person who operates any vehicle with severe defects shall be subject to the penalties provided in CGS Section 14-80h, as amended by Public Act No. 88-313. Any vehicle found with severe defect(s) shall be declared or marked out-of-service.

(Effective February 24, 1989)

Sec. 14-80h-5. Out-of-service braking system defects

Any one of the following listed defects shall be considered to be an out-of-service condition.

(a) Air brake system.

(1) Absence of braking action upon application of the service brakes, such as brake shoe(s) failing to move upon application of a wedge, S-cam, cam or disc brake.

(2) Missing or broken mechanical components including: shoes, linings, pads, springs, anchor pins, spiders, cam rollers, push-rods and air chamber mounting bolts.

(3) Loose brake components including air chambers, spiders and cam shaft support brackets.

(4) Audible air leak at a brake chamber.

(5) Beyond readjustment limits. See adjustment limits Diagram No. 2, 3, 5 and 6.

With air brakes applied at 80–90 psi if one brake is more than $\frac{1}{4}$ inch beyond the readjustment limit. (Example: Type 30 clamp type brake chamber push-rod measured at $2\frac{1}{4}$ inches would be a defective brake).

(b) Brake linings or pads.

(1) Linings or pads not firmly attached to the shoe.

(2) Linings or pads saturated with oil, grease or brake fluid.

(3) Air brakes. Lining with a thickness less than $\frac{1}{4}$ inch at the shoe center for drum brakes, or less than $\frac{1}{8}$ inch for disc brakes.

(4) Hydraulic and electric brake. Lining with a thickness $\frac{1}{16}$ " or less, at the shoe center for drum brakes.

(c) **Missing brake.** Missing brake on any axle required to have brakes in accordance with Federal Motor Carrier Safety Regulation FMCSR-CFR Title 49, 393.42 (b).

(d) **Unbalanced steering axle brakes.** Steering axle brakes include power unit, full trailer, or dolly. When the difference in brake push-rod stroke between each side of a motor vehicle steering axle is $\frac{1}{2}$ inch or more, or when one (1) of the brakes is $\frac{1}{4}$ inch or more beyond the readjustment limit. See Diagrams Nos. 5 and 6 for readjustment limit.

(e) **Parking brake.** No brakes on the vehicle or combination are applied upon actuation of the parking brake control, including driveline hand-controlled parking brake.

(f) **Brake drum or disc.** One (1) brake drum or disc (rotor) with an external crack or cracks that do not open upon brake application. (Note: Do not confuse short hairline heat cracking cracks with flexural cracks.)

(g) **Brake hose.**

(1) Hose with any damage extending through the outer reinforcement ply. Rubber impregnated fabric cover is not a reinforcement ply. Thermoplastic nylon may have braid reinforcement or color difference between cover and inner tube. Exposure of second color is out of service. See Diagram No. 1.

(2) Hose with audible leak at other than a proper connection.

(3) Air hose cracked, broken or crimped.

(4) Any brake line or hose that is in contact with any part of the exhaust system.

(5) Tubing with an audible leak at other than a proper connection.

(6) Tubing cracked, damaged by heat, broken or crimped.

(7) Two hoses improperly joined, such as a splice made by sliding the hose ends over a piece of tubing and clamping the hose to the tube even if there is no movement at the splice.

(h) **Air pressure gauge.** Missing or inoperative air pressure gauge. See Diagram No. 4.

(i) **Low pressure warning device.** Missing, inoperative, or does not operate below 60 psi or (½) the governor cutout pressure, whichever is less, except if exempt under Federal Motor Carrier Safety Regulation (FMCSR).

(j) **Air pressure leakage.** It will be necessary to record the pressure over a time interval corresponding to the test gauge increments for accuracy.

(1) With the air system fully charged and the trailer lines connected (if applicable), stop the engine and with the brakes released, observe the time for a pressure drop of two gauge increments. If leakage rate with brakes released in one to five minutes exceeds:

(A) 2 psi/minute for single vehicles.

(B) 3 psi/minute for combination vehicles with additional 2 psi drop allowed for each additional towed vehicle.

(2) After determining the pressure loss with the brakes released, make a full brake application and observe the time for a pressure drop of two gauge increments while the brakes are fully applied (engine off). If leakage rate with full brake application in one (1) minute exceeds:

(A) 3 psi for single vehicles.

(B) 4 psi for combination vehicles with additional 2 psi drop allowed for each additional towed vehicle.

(k) **Tractor-protection valve.** Inoperable or missing air supply protection check valve(s) on power unit.

(l) **Air pressure build-up time.** With trailer(s) uncoupled (if applicable) and tires chocked, fully charge the system to governor cut-out pressure. Make one (1) full brake application and note air pressure reading on gauge. Continue to reduce the air pressure by moderate brake applications to at least 10 psi below the governor cut-in pressure. Release the brake and run the engine at the manufacturers maximum recommended R.P.M. and determine the time required to increase the air pressure from the level achieved after one (1) brake application to the governor cut-out pressure. See Diagram No. 4. Vehicle is to be placed "Out of Service" if the time

required to build up pressure from the level after one (1) brake application to governor cutout pressure is more than 30 seconds.

(m) **Air compressor.** Normally to be inspected when readily visible or when conditions indicate compressor problems.

(1) Compressor drive belts in condition of impending or probable failure.

(2) Loose compressor mounting bolts.

(3) Cracked, broken or loose compressor pulley.

(4) Cracked, or broken compressor mounting brackets, braces or adapters.

(n) **Air reservoir.**

(1) Mounting bolts loose or missing, as determined by visible inspection of bolts.

(2) Inoperable or missing air supply protection check valve(s).

(o) **Electric brakes.**

(1) Absence of braking action on a single brake wheel of a vehicle or combination of vehicles.

(2) Missing or inoperable breakaway braking device.

(p) **Hydraulic brakes.** Conditions found on systems including power assist over hydraulic and engine drive hydraulic booster.

(1) Absence of braking action on a single brake wheel of a vehicle or combination of vehicles.

(2) Master cylinder less than $\frac{1}{4}$ full, as normally inspected when readily visible or problems are apparent.

(3) Seeping or swelling brake hose(s) under application of pressure.

(4) Missing or inoperative check valve.

(5) Any visually observed leaking hydraulic fluid in the brake system.

(6) Hydraulic hose(s) abraded (chafed) through outer cover-to-fabric layer.

(7) Fluid lines or connections restricted, crimped, cracked or broken.

(8) Brake failure light/low fluid warning light on.

(q) **Condition of combination electric hydraulic booster power brake system.**

(1) Absence of braking action on a single wheel of a vehicle or combination of vehicles.

(2) The fluid in the hydraulic pump reservoir is below the minimum level as defined by the manufacturer.

(3) There are broken, kinked or restricted fluid lines or hoses.

(4) There is any leakage of fluid, except for common wetting or weep, at the pump and steering gear hydraulic fluid circuit, or brake booster, or any of the line(s) or hose(s) in the system.

(5) Hydraulic pump belts are frayed, cracked, or excessively worn.

(r) **Operation of combination electric hydraulic booster system.**

(1) Electric motor does not operate.

(2) The brake warning light is not illuminated with the ignition (start) switch in "on" position prior to starting engine.

(3) Pedal does not move slightly as engine is started while force is on brake pedal.

(4) Brake warning light remains illuminated after engine is started.

(s) **Height sensing brake proportioning valve (HSBPV).** If link is disconnected, broken, etc. on systems with HSBPV.

(t) **Vacuum brake system.**

(1) Insufficient vacuum reserve to permit one full brake application after engine is shut off.

(2) Vacuum hose(s) or line(s) restricted, abraded, (chafed) through outer cover-to-cord ply, crimped, cracked, broken or has collapse of vacuum hose(s) when vacuum is applied.

- (3) Lacks an operative low-vacuum warning device when required.
 - (4) If audible leak of air into brake vacuum system is heard.
 - (5) Absence of braking action on a single brake wheel of a vehicle.
- (Effective December 28, 1990)

Sec. 14-80h-6. Out-of-service braking system defects in combination

Any of the following combination of defects shall be considered an out-of-service condition:

(a) **Air brake system.**

(1) Two (2) brakes less than $\frac{1}{4}$ inch or more beyond the readjustment limit also equal one (1) defective brake. Example: Two (2) type 30 chamber pushrods measured at $2\frac{1}{8}$ inches would equal one defective brake. See Brake Adjustment Diagram Nos. 5 and 6 for readjustment limits.

(2) Two (2) or more linings with a thickness less than $\frac{1}{4}$ inch at the shoe center for drum brakes or less than $\frac{1}{8}$ inch for disc brakes.

(b) **Mismatch across a motor vehicle steering axle, full trailer or dolly of:**

- (1) One (1) air chamber size;
- (2) One (1) slack adjuster length; or
- (3) One (1) retracted push-rod length differs by more than $\frac{1}{2}$ inch from opposite push-rod length. See Diagram No. 2.

(c) **Hydraulic brake system.** Two or more linings with a thickness $\frac{1}{16}$ " or less at the center for drum brakes and $\frac{1}{32}$ " or less for disc brake linings/pads.

(d) **Electric brake system.**

(1) Electric brakes with two or more linings with a thickness $\frac{1}{16}$ " or less at the shoe center for drum brakes.

(2) Electric brake system with absence of braking action on 20% or more of the wheels.

(Effective February 24, 1989)

Sec. 14-80h-7. Severe braking system defects

Any one of the following listed defects shall be considered to be severe:

(a) **Brake system.** No brake lining on shoe, no brake pad on backer plate, brake lining worn through to exposed metal.

(b) **Brake drum or disc.** Brake drum or disc (rotor) with external crack or cracks that are open or open upon brake application.

(c) **Brake hose.** Brake hose with bulge/swelling when air pressure is applied.

(d) **Brake hose.** Two (2) portions of a brake line improperly joined, such as a splice made by sliding the hose ends over a piece of tubing and clamping the hose to the tube, when, at the point of the splice, hoses can be moved or separated by hand.

(e) **Hydraulic brakes.** No pedal reserve with engine running except by pumping pedal on systems including power assist over hydraulic and engine drive hydraulic booster.

(f) **Hydraulic brakes.** Power assist unit fails to operate on systems including power assist over hydraulic and engine drive hydraulic booster.

(g) **Hydraulic brakes.** Hydraulic brake fluid line(s) or connection(s) with evidence of purposefully being disconnected, restricted or crimped.

(h) **Defective brakes.** Evidence of intentional removal or rendering any brake system part(s) inoperative or ineffective.

(i) **Defective brakes.** Absence of braking action on only a right or only a left wheel on any steering axle of any vehicle, including a dolly and the front axle of a full trailer.

(Effective February 24, 1989)

Sec. 14-80h-8. Severe braking system defects in combination

Any one of the following combinations of defects, subsection (a) through (d), shall be considered to be severe:

(a) **Air brake system.** Air loss rate. If an air leak is discovered and the reservoir pressure is not maintained when the governor is cut-in and, reservoir pressure is between 80 & 90 psi and, the engine is at idle and, the service brakes are fully applied; in combination with one other “out-of-service” braking system defect.

(b) **Hydraulic brake system.** Brake failure warning/low fluid warning light on in combination with two other “out of service” hydraulic brake conditions.

(c) Any combination of out-of-service conditions, as specified in Sections 14-80h-5 (a) (1), 14-80h-5 (a) (5) and 14-80h-5 (c) of these regulations, which affect 30% or more of the wheels required to have brakes on a single vehicle or combination vehicle.

(d) Any vehicle with a sufficient number of out-of-service brake defects, as specified in Section 14-80h-5 and 14-80h-6 of these regulations, such that the total number of out-of-service braking system defects on a single vehicle or combination vehicle exceeds the number of axles requiring brakes.

(Effective February 24, 1989)

TRUCK BRAKE DIAGRAMS

Diagram no. 1

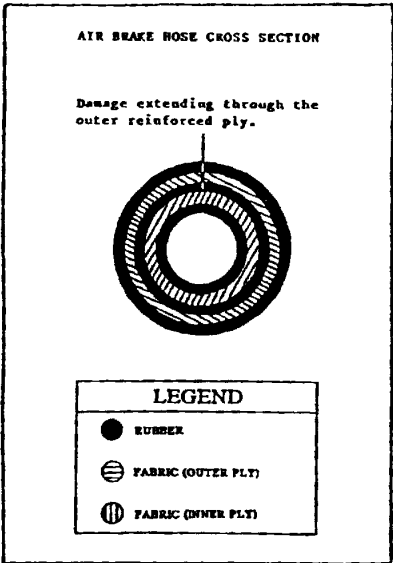


Diagram no. 2

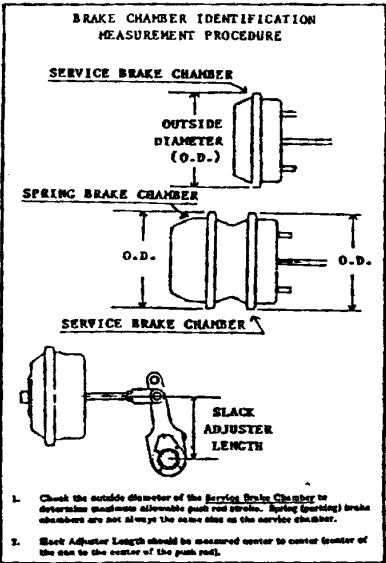


Diagram no. 3

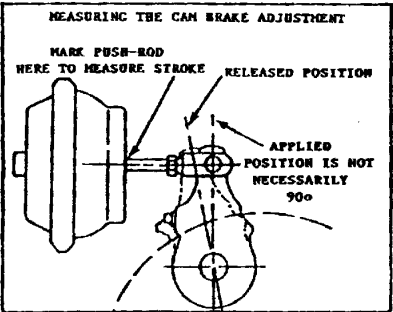
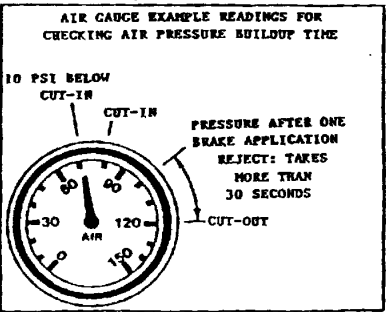


Diagram no. 4



BRAKE ADJUSTMENT CHART

Diagram no. 5
Brake Adjustment. Shall Not Meet Or Exceed Those Specifications Contained Hereunder Relating To
Maximum Stroke at Which Brakes Should Be Readjusted. (Dimensions In Inches.)

BOLT TYPE BRAKE CHAMBER DATA					
Type	Effective Area (Sq. In.)	Outside Diameter	Maximum Stroke	Maximum Stroke With Brakes Adjusted	Maximum Stroke At Which Brakes Should Be Readjusted
A	12	6-15/16	1-3/4	Should be as short as possible without brakes dragging	1-3/8
B	24	9-3/16	2-1/4		1-3/4
C	16	8-1/16	2-1/4		1-3/4
D	6	5-1/4	1-5/8		1-1/4
E	9	6-3/16	1-3/4		1-3/8
F	36	11	3		2-1/4
G	30	9-7/8	2-1/4		2
BENDIX WESTINGHOUSE					
DD 2					2
DD 3					2

BRAKE ADJUSTMENT CHART

Diagram no. 6

ROTOCHAMBER DATA

Type	Outside Diameter	Maximum Stroke With Brakes Adjusted	Maximum Stroke At Which Brakes Should Be Readjusted
9	4-9/32	Should be as short as possible without brakes dragging	1-1/2
12	4-13/16		1-1/2
16	5-13/32		2
20	5-15/16		2
24	6-13/32		2
30	7-1/16		2-1/4
36	7-5/8		2-3/4
50	8-7/8		3

CLAMP TYPE BRAKE CHAMBER DATA

6	4-1/2	Should be as short as possible without brakes dragging	1-1/4
9	5-1/4		1-3/8
12	5-11/16		1-3/8
16	6-3/8		1-3/4
20	6-25/32		1-3/4
24	7-7/32		1-3/4 (See Note)
30	8-3/32		2
36	9		2-1/4

NOTE: 2 inches for long stroke design.

WEDGE BRAKE DATA

Movement of the scribe mark on the lining shall not exceed 1/16 inch.